Analytical Group: Metals (Arsenic, Lead and PM-10)				
Zone 2 Properties	XRF analysis of composite soil sample during excavation	Outdoor air sampling during excavation at downwind property perimeter and residence entrance	Outdoor air sampling during backfill at residence entrance	Interior dust sampling pre- and/or post- cleaning; and XRF screening for lead-based paint (as necessary)
NON RESPONSIVE	NON RESPONSIVE			

Worksheet #18-2—Sampling Locations and Requirements

Analytical Group: Metals (Arsenic, Lead)	
Zone 3 Properties	Interior dust sampling pre- and/or post- cleaning; and XRF screening for lead-based paint (as necessary)
	See Parsons *Interior Residential Dust Cleaning and Sampling Plan* for all locations, frequency, and requirements associated with interior dust sampling and lead-based paint screening.

Analytical Group: Metals (Arsenic, Lead)	
Zone 3 Properties	Interior dust sampling pre- and/or post- cleaning; and XRF screening for lead-based paint (as necessary)

Analytical Group: Metals (Arsenic, Lead)	
Zone 3 Properties	Interior dust sampling pre- and/or post- cleaning; and XRF screening for lead-based paint (as necessary)
Number of Properties	

Worksheet #18-3—Sampling Locations and Requirements

Analytical Group: Metals (Arsenic, Lead and PM-10)			
Chemours East Chicago Disposal Stockpile Site	One 10-part composite sample per 1,000 cubic yards of Zone 2 and 3 stock piles	Real-time air sampling during upwind and downwind of disposal stockpiles	Perimeter air monitoring upwind and downwind of disposal stockpiles
NON RESPONSIVE	See Parsons *Temporary Storage, Transportation, and Disposal Plan for Zones 2 and 3* for all locations, frequency, and requirements associated soil sampling.	See Parsons *Temporary Storage, Transportation, and Disposal Plan for Zones 2 and 3* for all locations, frequency, and requirements associated with air sampling.	See Parsons *Temporary Storage, Transportation, and Disposal Plan for Zones 2 and 3* for all locations, frequency, and requirements associated with air sampling.

Worksheets #19 and #30-1—Analytical SOP Requirements Table

Laboratory: ALS-Holland

Matrix	Analytical Group	Analytical and Preparation Method/ SOP Reference	Containers (number, size, and type)	Sample Volume (amount)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Soil	ICP Metals	Preparation Method: EPA 3050B Preparation SOP: HN-MET-009 Analysis Method: EPA 6010C Analysis SOP: HN-MET-015	4 oz jar Clear WM Teflon Liner	5 g	Cool to ≤ 6°C	6 months
Soil	TCLP Metals	Preparation Method: EPA 1311 Preparation SOP: HN-EXT-004 Preparation Method: EPA 3005A Preparation SOP: HN-MET-010 Analysis Method: EPA 6010C Analysis SOP: HN-MET-015	4 oz jar Clear WM Teflon Liner	150 g	Cool to ≤ 6°C	6 months
Soil	ICP-MS Metals	Preparation Method: MDEQ SOP 213 Preparation Method: EPA 3050B Preparation SOP: HN-MET-009 Analysis Method: EPA 6020A Analysis SOP: HN-MET-008	4 oz jar Clear WM Teflon Liner	100 g	Cool to ≤ 6°C	6 months
Soil	CVAAS - Mercury	Preparation/Analysis Method: EPA 7471A/B Analysis SOP: HN-MET-006	4 oz jar Clear WM Teflon Liner	100 g	Cool to ≤ 6°C	28 days
Soil	PAHs	Preparation Method: EPA 3550 Preparation SOP: HN-EXT-013 Analysis Method: EPA 8270DSIM Analysis SOP: HN-SMS-001	16-oz glass, Teflon-lined lid	250 g	Cool to ≤ 6°C	Samples extracted within 14 days and analyzed within 40 days following extraction
Soil	8260B	Analysis Method: EPA 8260B Analysis SOP: HN-VMS-003 Preparation Method: EPA 5035 Preparation SOP: HN-PT-004	3X Encore® TerraCore® 40 mL VOA with 5 mL of MeOH	5 g	4°C	Cool the coring device to 4 ± 2°C 48 hrs Sample is extruded into an empty vial and frozen on-site to -7 to

Matrix	Analytical Group	Analytical and Preparation Method/ SOP Reference	Containers (number, size, and type)	Sample Volume (amount)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
						-20°C 14 day Sample is extruded into a vial containing reagent water, cooled to 4 ± 2°C (no more than 48 hours), then frozen to -7 to -20°C 14 days
Soil	8270D	Preparation Method: EPA 3546 Preparation SOP: HN-EXT-016 Analysis Method: EPA 8270D Analysis SOP: HN-SMS-001	16-oz glass	250 g	Cool to ≤ 6°C	Samples extracted within 14 days and analyzed within 40 days following extraction
Soil	Organochlorine Pesticides	Preparation Method: EPA 3546 Preparation SOP: HN-EXT-016 Analysis Method: EPA 8081A Analysis SOP: HN-GC-001	16-oz glass	250 g	Cool to ≤ 6°C	Samples extracted within 14 days and analyzed within 40 days following extraction
Soil	PCBs	Preparation Method: EPA 3546 Preparation SOP: HN-EXT-016 Analysis Method: EPA 8082 Analysis SOP: HN-GC-002	16-oz glass	250 g	Cool to ≤ 6°C	Samples extracted within 14 days and analyzed within 40 days following extraction
Soil	Herbicides	Preparation Method: EPA 8151A Preparation SOP: HS-EXT004 Analysis Method: EPA 8151A Analysis SOP: HS-GCECD003	4 oz jar Clear WM Teflon Liner	30 g	Cool to ≤ 6°C	Samples extracted within 14 days and analyzed within 40 days following extraction

Worksheets #19 and #30-2—Analytical SOP Requirements Table

Laboratory: ALS-Cincinnati

Matrix	Analytical Group	Analytical and Preparation Method/ SOP Reference	Containers (number, size, and type)	Sample Volume (amount)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Air	Gravimetric Total Particulates as PM-10	Analysis Method: 40CFR50, Appendix J Analysis SOP: IH-002	Manila Envelope capable of enclosing an 8 inch by 10 inch filter	2 to 750 ug/m3 at standard conditions	Shipping and storage: Ambient conditions During filter equilibration: Temp between 15°C and 30°C, controlled relative humidity <50%	NA
Air	Inorganics Metals IOM 3.4, EPA 6010 B and IH7300	Preparation Method: IOM 3.4 Preparation SOP: IH-006 Analysis Method: EPA 6010 B Analysis SOP: IH-006 and IH-7300	Manila Envelope capable of enclosing an 8 inch by 10 inch filter	A 1 inch by 8 inches strip taken from the sampling filter	Ambient conditions	NA

Laboratory: A&L Great Lakes Laboratories

Matrix	Analytical Group	Analytical and Preparation Method/ SOP Reference	Containers (number, size, and type)	Sample Volume (amount)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Soil	Agronomic	Analysis Method:	Jar or ziplock bag	1 cup equivalent	none	NA

Laboratory: Environmental Protection Industries (EPI)

Matrix	**Analytical Group**	**Analytical and Preparation Method/ SOP Reference**	**Containers** (number, size, and type)	**Sample Volume** (amount)	**Preservation Requirements** (chemical, temperature, light protected)	**Maximum Holding Time** (preparation / analysis)
Soil	Geotechnical	Analysis Method:	5-gallon buckets	Two 5-gallon buckets	none	NA

Worksheet #20—Field Quality Control Summary

20.1 Field Duplicate Samples

Field duplicates are two field samples taken concurrently at the same location. They are intended to represent the same population and are taken through all steps of the sampling and analytical procedures in the same manner as the associated native sample. The samples are used to assess the precision of the entire data collection activity, including sampling, sample handling and storage, and site heterogeneity. Field duplicate samples will not be collected for stockpile soil samples since field QC is not required for samples collected for disposal purposes.

Vacuum dust samples are not subject to the standard QA/QC requirements applied for most other sampling methods (field duplicates, blanks and matrix spike/matrix spike duplicate) as a result both of the nature of vacuum dust sample collection and of the analytical methods used by the laboratory (Tetra Tech 2017). Therefore, field duplicate samples will not be collected for interior dust samples.

Parsons serves in a QA capacity for the remediation consulting firm; therefore, no field duplicate samples are collected or analyzed for the agronomic or geotechnical analyses.

20.2 Matrix Spike/Matric Spike Duplicate Samples

Matrix spike samples are an aliquot of the sample spiked with known concentrations of specific analytes. The spiking occurs before sample preparation and analysis at the laboratory. MS/MSD samples will not be collected for the air monitoring.

Parsons serves in a QA capacity for the remediation consulting firm; therefore, no matrix spike samples are collected or analyzed for the agronomic or geotechnical analyses.

20.3 Field Blanks

Field blanks are collected to assess the potential introduction of contaminants from the surroundings by pouring deionized water directly into the sampling containers while out in normal field conditions. Field blanks, if deemed necessary, would be collected at a frequency of one per week. The field blank samples are analyzed for the same parameters as the field samples. Field blanks are not planned to be collected during this effort.

20.4 Equipment Blanks

Equipment blanks are collected to assess the potential introduction of contaminants from non- dedicated equipment by pouring deionized water over the decontaminated equipment and then into the sampling containers, and analyzed by the laboratory for the same parameters as the field samples. These blanks are used to assess the effectiveness of equipment decontamination procedures. Equipment blanks are not planned to be collected during this effort.

Worksheet #20-1—Field Quality Control Summary Table

Note: Agronomic and Geotechnical laboratory field quality control not detailed below

Matrix	Analyte Group	Estimated Number of Field Samples
ALS - Stock Pile Soil	Metals	25
ALS - Air	Metals	240
ALS - Interior Dust	Metals	1,000
ALS - Backfill/topsoil*	Refer to WS#15.6	5
A&L Great Lakes – Backfill/topsoil*	Agronomic	5
EPI – Backfill/topsoil*	Geotechnical	5

Quantities are estimated and are subject to change.

No field duplicates, matrix spikes, matrix spike duplicates, field blanks, equipment blanks or trip blanks will be required due to the matrix itself (air and dust) or the purpose for sample collection (soils for disposal purposes).

* Backfill/topsoil analyses quantities reflect QA function only.

Worksheet #21—Standard Operating Procedures for Field Sampling Work

Note: Agronomic and Geotechnical laboratory standard operating procedures are not detailed below.

SOPs for Soil and Air Field Sampling Tasks (provided in Parsons Exterior Field Sampling Plan for Zone 2)

Reference Number	Title	Originating Organization
SOP-01	Borrow Source Soil Sampling	Parsons
SOP-02	Soil Sampling at Zone 2 Properties	Parsons
SOP-03	Soil X-Ray Fluorescence Field Sampling	Parsons
SOP-04	Sampling Equipment Decontamination	Parsons
SOP-05	Sample Containers and Preservation	Parsons
SOP-06	Sample Storage, Packaging and Shipment	Parsons
SOP-07	Sample Control and Custody Procedures	Parsons
SOP-08	Air Sampling	Parsons

SOPs (Parsons) for soil and air field sampling by Parsons will follow equipment use instructions.

SOPs for Interior Dust Sampling Tasks (provided in Parsons Interior Residential Dust Cleaning and Sampling Plan for Zones 2 and 3)

Reference Number	Title	Originating Organization
SOP-002	General Equipment Decontamination	Tetra Tech, Inc
SOP-019	Packaging and Shipping Samples	Tetra Tech, Inc
SOP-024	Recording Notes in Field Logbooks	Tetra Tech, Inc
SOP-071	Interior Dust Sampling using a HEPA Vacuum	Tetra Tech, Inc
SOP-203	Laboratory Analytical Data Verification-minimum Requirements	Tetra Tech, Inc
SOP-PWT-ENSE-430	Indoor and Attic Dust Sampling	Tetra Tech, Inc

SOPs for dust sampling tasks will follow Parsons Interior Residential Sampling and Dust Cleaning Plan for Zones 2 and 3 (Parsons May 2018). Attached as Appendix B are the associated SOPs for ease of access by field personnel.

Worksheet #22—Field Equipment Calibration, Maintenance, Testing, and Inspection

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[a]
Olympus Handheld XRF Analyzer Delta Professional	Check standards at startup and every 4 hours during use.	Performed per manufacturer's instructions.	Screens lead and arsenic contamination in soil and lead-based paint.	Daily	Reads within 20% of the NIST standard reference samples.	If XRF fails to calibrate correctly, then do not use this XRF.	Soil Excavation and Backfill Sampling Manager and Interior Sampling Manager	SOP-03 See Exterior Field Sampling Plan
PQ100 Ambient Air Particulate Sampler	Use of DeltaCal or TetraCal (formally triCal) is highly recommended for calibration of the PQ100.	Model-specific, per manufacturer's recommendation.	Collection of arsenic, lead and PM10 from air samples.	Once per week	0.5% (When calibrated with a deltaCal or tetraCal (formally triCal)	If initial and post-sampling calibration rates are greater than 10 percent different, then sample must be voided.	Soil Transfer Disposal Sampling Manager	SOP-08 See Temporary Storage, Transportation, and Disposal Plan for Zone 2 and 3

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[a]
ThermoFisher Scientific Personal DataRAM™ pDR-1000AN Monitor	Model-specific, per manufacturer's recommendation.	Gradual build-up of contamination on the interior surfaces of the sensing chamber components may occur from prolonged use. If monitor indicates BACKGROUND HIGH message interior of the sensing chamber should be cleaned at the first convenient opportunity, proceeding as indicated in the manufacturer's user guide.	Continuous collection of arsenic and lead concentration in dust	Daily	±0.5 of reading or ±0.015 mg/m3, whichever is larger, for 1 second averaging time, ±0.5 of reading or ±0.015 mg/m3, whichever is larger for 10 second averaging time, ±0.2% of reading or ±0.005 mg/m3, whichever is larger for 60 second averaging time±	If initial and post-sampling calibration rates are greater than 5 percent different, then sample must be voided.	Soil Transfer Disposal Sampling Manager	SOP-08 See Temporary Storage, Transportation, and Disposal Plan for Zone 2 and 3

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference[a]
Sensidyne GilianAir5	Field calibration (flow rate verification) must be performed before sampling and when setting the flow rate.	Rechargeable batteries must be fully charged and properly maintained to achieve maximum pump run time. Inlet filter should be changed after six months of regular use or whenever outer portion of filter becomes discolored.	Analysis of lead and arsenic from dust filters,	Weekly			Soil Excavation and Backfill Sampling Manager	SOP-08 See Exterior Field Sampling Plan
TSI DUSTTRAK™ Environmental Monitor	Model-specific, per manufacturer's recommendation.	Model-specific, per manufacturer's recommendation.	Continuous collection of arsenic and lead concentration in dust	Daily			Soil Excavation and Backfill Sampling Manager	SOP-08 See Exterior Field Sampling Plan
HEPA Vacuum/Omega Vac Supreme Indoor Dust Sampling Equipment	Model-specific, per manufacturer's recommendation.	Model-specific, per manufacturer's recommendation.	Analysis of lead and arsenic from vacuum filters,	As required	Scale to weigh HEPA filers with minimum 1-gram sensitivity	Additional precautions may be needed for stabilizing Filters during shipment.	Interior Sampling Manager	SOP-071 See Interior Residential Dust Cleaning and Sampling Plan for Zones 2 and 3

[a] Refer to the project SOPs table (Worksheet #21).

Worksheet #23—Analytical SOPs

The agronomic and geotechnical laboratories use American Society for Testing and Materials (ASTM) methods and are not detailed below.

Laboratory: ALS-Holland

Lab SOP Number	Title	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	
Preparatory Methods						
HN-EXT-004	TCLP Extraction of Non-Volatiles (EPA 1311)	Definitive	Metals (Soil)	Preparation	ALS Environmental, Holland	
HN-MET-007	Soil Fractionation for Pb Analysis (MDEQ 213)	Definitive	Metals (Soil, Dust)	Preparation	ALS Environmental, Holland	
HN-MET-009	Acid Digestion of Solids (EPA 3050B)	Definitive	Metals (Soil, Dust)	Preparation	ALS Environmental, Holland	
HN-MET-010	Aqueous Metals Digestion (EPA 3005A)	Definitive	Metals (TCLP)	Preparation	ALS Environmental, Holland	
HN-EXT-013	Ultrasonic Extraction (EPA 3550C)	Definitive	PAH SIM (Soil, Sediment)	Preparation	ALS Environmental, Holland	
HN-EXT-016	Microwave Extraction (EPA 3546)	Definitive	SVOCs/ Pest/PCB (Soil, Sediment)	Preparation	ALS Environmental, Holland	
HN-PT-004	Volatile Organics Extraction (EPA 5035A)	Definitive	VOCs (Soil, Sediment)	Preparation	ALS Environmental, Holland	
HS-EXT004	EXTRACTION OF HERBICIDES FROM SOILS by 8151A	Definitive	Chlorinated Herbicides	Preparation	ALS Environmental, Houston	
Analytical Methods						
HN-MET-008	Metals by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) (EPA 6020A)	Definitive	Metals (Soil, Dust, TCLP)	ICP-MS	ALS Environmental, Holland	

Lab SOP Number	Title	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	
HN-MET-006	Mercury – Solids (CVAAS) (EPA 7471A/B)	Definitive	Metals (Soil)	CVAAS	ALS Environmental, Holland	
HN-MET-015	Metals by Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) (EPA 6010C)	Definitive	Metals (Soil, Dust, TCLP)	ICP-OES	ALS Environmental, Holland	
HN-WC-018	Percent Moisture (EPA 3550C)	Definitive	General Chem (Soil, Sediment)	Gravimetric	ALS Environmental, Holland	
HN-VMS-003	Volatile Organic Compounds by GC/MS (EPA 8260B)	Definitive	VOCs (Soil, Sediment)	GC-MS	ALS Environmental, Holland	
HN-SMS-001	Semi-Volatile Organic Compounds by GC/MS (EPA 8270D)	Definitive	SVOCs (Soil, Sediment)	GC-MS	ALS Environmental, Holland	
HN-GC-001	Organochlorine Pesticides (EPA 8081A)	Definitive	PEST (Soil, Sediment)	GC-ECD	ALS Environmental, Holland	
HN-GC-002	Polychlorinated Biphenyls by EPA 8082	Definitive	PCB (Soil, Sediment)	GC-ECD	ALS Environmental, Holland	
HS-GCECD003	Herbicides by Method 8151A	Definitive	Herbicides (Soil, Sediment, Aqueous)	GC-CED	ALS Environmental, Houston	
General Laboratory SOPs						
HN-SM-001, R09	Sample Receipt	N/A	N/A	N/A	ALS Environmental, Holland	
HN-SM-003, R05	Sample Log-In Procedure	N/A	N/A	N/A	ALS Environmental, Holland	

Lab SOP Number	Title	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	
HN-SAF-001. R06	Waste Disposal Procedures	N/A	N/A	N/A	ALS Environmental, Holland	

Laboratory: ALS-Cincinnati

Lab SOP Number	Title	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	
Preparatory and Analysis Methods						
IH-002	Determination of Suspended Particulates in the Atmosphere Using Various Media	Definitive	Air/Gravimetric	Analytical Balance	ALS Environmental, Cincinnati	
IH-006	Methods IO-3.1 and IO-3.4 Modified for Metals Preparation and Analysis for Suspended Particulates	Definitive	Air/Inorganics	ICP	ALS Environmental, Cincinnati	
IH-7300	Elements by ICP	Definitive	Air/Inorganics	ICP	ALS Environmental, Cincinnati	
General Laboratory SOPs						
SC-001	Sample Receipt and Logging	N/A	N/A	N/A	ALS Environmental, Cincinnati	
SC-002	Sample Scheduling	N/A	N/A	N/A	ALS Environmental, Cincinnati	
SC-003	Sample Storage and Disposal Control	N/A	N/A	N/A	ALS Environmental, Cincinnati	

Lab SOP Number	Title	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	
SC-004	Sample Storage and Security	N/A	N/A	N/A	ALS Environmental, Cincinnati	

No SOPs were modified for this project.

Worksheet #24—Analytical Instrument Calibration

Note: Agronomic and Geotechnical laboratory analytical instrument calibration are not detailed below. Backfill and topsoil analytical instrument calibration are not detailed below; refer to worksheet #23 for SOP references and Appendix A for SOPs.

Laboratory: ALS-Holland Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	CA	Person Responsible for CA	SOP Reference
Thermo ICP-OES EPA Method 6010C	Establish IDLs	Every 3 months	In accordance with manufacturer's recommendation or lab SOP.	Notify the manufacturer if problem occurs.	Certified instrument technician	HN-MET-015
	Calibrate using LLICV at MRL	Daily prior to sample analysis	±30% of the true value	Identify and correct problem then recalibrate if necessary.	Lab Manager/Analyst or certified instrument technician	
	Establish linear dynamic range	Once every 6 months or when the system is repaired	The calculated value should be within ± 10% of the true value.	Correct problem, then repeat the calibration process.	Lab Manager/Analyst or certified instrument technician	
	Run interference check solution (ICS)	At the beginning of analytical run	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes)	Correct problem, then repeat the calibration process or use internal standards to eliminate the problem.	Lab Manager/Analyst or certified instrument technician	
	Run second source calibration verification (ICV)	Once after standard calibration	±10% of its true value.	Correct problem, then repeat the calibration process.	Lab Manager/Analyst or certified instrument technician	
	Run CCV	Once every 10 samples	±10% of its true value.	Terminate analysis; recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	
	Run CCB	Once every 10 samples	Less than the established lower limit of quantitation for any desired target analyte.	Terminate analysis; recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	

Laboratory: ALS-Holland Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	CA	Person Responsible for CA	SOP Reference
Agilent ICP-MS EPA Method 6020A	IDLs	Every 3 months	In accordance with manufacturer's recommendation or laboratory SOP.	Notify the manufacturer if problem occurs.	Lab Manager/Analyst or certified instrument technician	HN-MET-008
	Tuning	Prior to initial calibration	Mass calibration ≤0.1 amu from true value; Resolution <0.9 amu full width at 10% peak height; For stability, RSD ≤5% for at least four replicate analyses.	Correct problem, then repeat tuning.	Lab Manager/Analyst or certified instrument technician	
	IC using either single or multi-point standard calibration	Daily prior to analysis of sample	Correlation coefficient ≥0.998.	Correct problem, then repeat initial calibration.	Lab Manager/Analyst or certified instrument technician	
	Linear dynamic range or high level check standard	Once every 6 months or when the system is repaired	The calculated value should be within ±10% of the true values.	Correct problem, then repeat the calibration process.	Lab Manager/Analyst or certified instrument technician	
	Interference check solution	At the beginning of each analytical run	ICS-A: Absolute value of concentration for all non-spiked analytes <2 × MDL (unless they are a verified trace impurity from one of the spiked analytes). ICS-AB: Within ±20% of its true value.	Correct problem, then repeat the calibration process or use internal standards to eliminate the problem.	Lab Manager/Analyst or certified instrument technician	
	Second-source ICV	Once after standard calibration	Within ±10% of its true value.	Correct problem, then repeat the calibration process.	Lab Manager/Analyst or certified instrument technician	
	Run lower limit of quantitation limit	Once after ICV and after every CCB	Within ±30% of its true value.	Qualify the data as estimated values.	Lab Manager/Analyst or certified instrument technician	
	Internal standards	Every analysis	Internal standard intensity within 70–170% of intensity of the internal standard in the initial calibration.	Terminate the analysis, correct the problem, recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	

Laboratory: ALS-Holland Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	CA	Person Responsible for CA	SOP Reference
	CCV	Following IC, after every 10 samples and the end of the sequence	±10% of its true value.	Terminate analysis; recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	
	CCB	After IC, after CCV calibration, after every 10 samples and the end of the sequence	Less than 1/2 reporting limit.	Terminate analysis; recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	
Drying Oven	Measure oven temperature against a calibrated thermometer	Annually	In accordance with unit model and manufacturer's recommendation or laboratory SOP.	Terminate analysis, recalibrate, and verify before sample analysis.	Lab Manager/Analyst or certified instrument technician	HN-EQ-002
Analytical Balance	Calibrate against verified (National Institute of Standards and Technology) mass	Daily or prior to analyzing samples	In accordance with unit model and manufacturer's recommendation or laboratory SOP.	Terminate analysis, recalibrate, and verify before sample analysis.	Lab Manager/Analyst or certified instrument technician	HN-EQ-001
pH Meter	Run a minimum 3-point calibration; run CCV	Daily or prior to analyzing samples; one CCV for every 10 samples	±0.1 unit.	Terminate analysis, recalibrate, and verify before sample analysis.	Lab Manager/Analyst or certified instrument technician	HN-WC-009

Laboratory: ALS-Cincinnati

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	CA	Person Responsible for CA	SOP Reference
Thermo ICP-AES	Establish IDLs	Annually	In accordance with manufacturer's recommendation or lab SOP.	Notify the manufacturer if problem occurs.	Certified instrument technician	IH-006, IH-7300
	Calibrate using LLICV at MRL	Daily prior to sample analysis	±30% of the true value	Identify and correct problem then recalibrate if necessary.	Lab Manager/Analyst or certified instrument technician	
	Establish linear dynamic range	Once every 6 months or when the system is repaired	The calculated value should be within ± 10% of the true value.	Correct problem, then repeat the calibration process.	Lab Manager/Analyst or certified instrument technician	
	Run interference check solution (ICS)	At the beginning of analytical run	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes)	Correct problem, then repeat the calibration process or use internal standards to eliminate the problem.	Lab Manager/Analyst or certified instrument technician	
	Run second source calibration verification (ICV)	Once after standard calibration	±10% of its true value.	Correct problem, then repeat the calibration process.	Lab Manager/Analyst or certified instrument technician	
	Run CCV	Once every 10 samples	±20% of its true value.	Terminate analysis; recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	
	Run CCB	Once every 10 samples	Less than the established lower limit of quantitation for any desired target analyte.	Terminate analysis; recalibrate and reanalyze the samples.	Lab Manager/Analyst or certified instrument technician	

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	CA	Person Responsible for CA	SOP Reference
Analytical Balance	Calibrate against verified (National Institute of Standards and Technology) mass	Daily or prior to use	In accordance with unit model and manufacturer's recommendation or laboratory SOP.	Terminate analysis, recalibrate, and verify before sample analysis.	Lab Manager/Analyst or certified instrument technician or QA Manager	IH-002

Notes:

%	percent
%D	percent difference
amu	atomic mass unit
CA	corrective action
CCB	continued calibration blank
CCV	continued calibration verification
MDL	method detection limit
N/A	not applicable
RSD	relative standard deviation
ICP-AES	inductively coupled plasma-optical emission spectroscopy
ICP-MS	inductively coupled plasma–mass spectroscopy
ICV	initial calibration verification
IDL	instrument detection limit
IS	internal standard
LOD	limit of detection
LOQ	limit of quantitation
CFR	Code of Federal Regulations
CRDL	contract-required detection limit
EPA	Environmental Protection Agency, United States
ICAL	initial calibration
SOP	standard operating procedure
ICS	interference check solution

Worksheet #25—Analytical Instrument and Equipment Maintenance, Testing, and Inspection

Note: Agronomic and Geotechnical laboratory instrument and equipment maintenance, testing and inspection are not detailed below. Backfill and topsoil instrument and equipment maintenance, testing and inspection are not detailed below; refer to worksheet #23 for SOP references and Appendix A for SOPs.

Laboratory: ALS-Holland

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
ICP-OES	Clean torch assembly and spray chamber when discolored or when degradation in data quality is observed. Clean nebulizer, check argon, replace peristaltic pump tubing as needed. Other maintenance specified in lab Equipment Maintenance SOP.	Metals	Torch, nebulizer chamber, pump, pump tubing.	Prior to ICAL and as necessary.	Acceptable calibration or CCV	Correct the problem and repeat calibration or CCV	Analyst, Department Manager	HN-EQ-004
ICP-MS	Clean torch assembly and spray chamber when discolored or when degradation in data quality is observed. Clean nebulizer, check argon, and replace peristaltic pump tubing as needed. Other maintenance specified in lab Equipment Maintenance SOP.	Metals	Torch, nebulizer, spray chamber, pump tubing.	Prior to ICAL and as necessary	Acceptable calibration or CCV	Correct the problem and repeat calibration or CCV	Analyst, Department Manager	HN-EQ-004
Balance	Weights	Moisture	Cleanliness	Prior to sample weighing	Acceptable Mass Verification	Correct the problem, retest	Analyst, Department Manager	HN-EQ-001

Laboratory: ALS-Cincinnati

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
ICP-AES	Clean torch assembly and spray chamber when discolored or when degradation in data quality is observed. Clean nebulizer, check argon, replace peristaltic pump tubing as needed. Other maintenance specified in lab Equipment Maintenance SOP.	Metals	Torch, nebulizer chamber, pump, pump tubing.	Prior to ICAL and as necessary.	Acceptable calibration or CCV	Correct the problem and repeat calibration or CCV	Analyst, Department Manager	GEN-008
Balance	Weights	Total Particulates as PM-10	Cleanliness	Prior to sample weighing	Weights fall within acceptable performance ranges	Correct the problem, perform internal recalibration, re-weigh weights.	Analyst, Department Manager	QA-011

Worksheets #26 and #27—Sample Handling, Custody, and Disposal

Sample Collection, Packaging, and Shipment

Sample Collection (Personnel/Organization): Keith Thompson, Florin Savin, Tony Doll, Morgan Todd - Parsons

Sample Packaging (Personnel/Organization): Keith Thompson, Florin Savin, Tony Doll, Morgan Todd - Parsons

Coordination of Shipment (Personnel/Organization): Keith Thompson, Florin Savin, Tony Doll, Morgan Todd - Parsons

Type of Shipment/Carrier: Courier Service or Federal Express Overnight

Sample Receipt and Analysis

Sample Receipt (Personnel/Organization): Chad Whelton/ALS; Randall Warden/A&L; Sergio Meilman/EPI

Sample Custody and Storage (Personnel/Organization): Chad Whelton/ALS;

Randall Warden/A&L; Sergio Meilman/EPI

Sample Preparation (Personnel/Organization): Chad Whelton/ALS;

Randall Warden/A&L; Sergio Meilman/EPI

Sample Determinative Analysis (Personnel/Organization): Chad Whelton ALS; Randall Warden/A&L; Sergio Meilman/EPI

Sample Archiving

Field Sample Storage (No. of days from sample collection): See QAPP Worksheet #23 for allowable holding time. The laboratory shall retain samples for at least 120 days after receipt.

Sample Extract/Digestate Storage (No. of days from extraction/digestion): See QAPP Worksheet #23 for allowable holding time. The laboratory sample custodian will store all extracts/digestates for 60 days after final report has been submitted.

Biological Sample Storage (No. of days from sample collection): N/A

Sample Disposal

Personnel/Organization: Laboratory Personnel

Number of Days from Analysis: The laboratory will retain samples for at least 120 days and sample extracts for at least 60 days, after submittal, pending the need for reanalysis

26.1 Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory)

Sample handling and chain-of-custody procedures will be performed per SOP-07, and packaging and shipping of environmental samples per SOP-06.

Sample coolers will be picked up by a laboratory designated courier to arrive at the laboratory on the same day or will be shipped to arrive the morning after sampling (priority overnight).

Regulations for packaging, marking/labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation. Air carriers that transport hazardous materials, in particular FedEx, require compliance with the current edition of the International Air Transport Association Dangerous Goods Regulations, which applies to shipment and transportation of hazardous materials by air carrier.

Following current International Air Transport Association regulations will ensure compliance with U.S. Department of Transportation regulations.

26.2 Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal)

Upon sample receipt, the laboratory sample custodian will verify package seals, open the packages, check temperature blanks, record temperatures, verify sample integrity, and inspect contents against chain-of-custody forms. The project chemist will be contacted to seek resolution of any discrepancies between sample containers and chain-of-custody forms through contract-defined channels of communication. Once the shipment and chain-of-custody form are in agreement, the sample custodian will initiate an internal chain-of-custody form, as well as supply the laboratory task manager with a sample acknowledgement letter. If the sample temperatures are outside the required range, the laboratory will contact the project chemist as to the proper course of action.

Samples will be logged in and assigned a unique laboratory number for each sample, and the number will be used by all laboratory personnel handling samples to ensure all sample information is captured. Analyses required will be specified by codes assigned to samples at login. Labels containing the laboratory sample number are generated and placed on sample bottles.

After the laboratory labels the samples, they will be moved to refrigerators where they will be maintained at less than 6 degrees Celsius.

When the analyst is ready to prepare and/or analyze the sample(s), an appropriate member of the sample management department will locate the sample(s) in the locked refrigerator, sign and date the internal sample tracking form, and provide the sample(s) to the analyst. When the analyst is finished with the sample(s), unused portions will be returned to an appropriate member of the sample management department for replacement in a secure refrigerator. The analyst will sign and date internal chain-of-custody forms. In the event that entire samples are depleted during analysis, a notation of "sample depleted" or "entire sample used" will be written on the internal chain-of-custody forms.

Samples will be stored in designated secure, refrigerated storage areas. Samples and sample extracts will be maintained in a secure storage until disposal. No samples or extracts will be disposed of without prior written approval from an appropriate member of the project team. The sample custodian will note the sample disposal date in the sample ledger. The laboratory will dispose of samples in accordance with applicable regulations. Documentation will be placed in a single, secured project file maintained by the laboratory project manager. The file will consist of the following components: agreements, correspondence, memorandums, notes, and data.

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation, field data, and notes will be filed with the laboratory data. Filed materials

may only be removed by authorized personnel on a temporary basis. Laboratories will retain project files and data packages for 5 years, unless otherwise agreed.

Laboratory sample receipt, log-in, scheduling and waste disposal SOPs are listed in worksheet #23.

26.3 Sample Identification Procedures

A sample numbering system will be used to identify each sample, including any duplicate samples. The sample identification number will be unique for each sample. Each sample will be assigned a Parsons site-specific identifier, which will contain a site- and sample-specific location name that indicates where the sample was obtained.

The sample identification number and sample location name will be included on the sample tag or label and the chain-of-custody record.

The site-specific identifier is based on the following system:

Sample Location Name

- **Location Identifier**—Using the established location identification for properties at this site, the location identifier is the first 4 letters of the street address followed by the first four numbers of the property address (e.g., 1234 Main Street is "MAIN1234").
- **Location type**—Project-specific code indicating the location or sample type: "SO-" for soil and "AR-" for air.
- **Designator**—Project-specific code to designate differences in grouped locations: "F" for front yard, "B" for back yard, "E" for entrance, "P" for perimeter - include as needed to establish unique location identifiers within a single facility database per project requirements.
- **Depth Interval**—Depth interval and unit for the following sample matrices/location types. The code will consist of a hyphen, followed by the starting and bottom depth intervals separated by a slash. The indicator will provide the depth that represents the start and end of the sample interval in inches below ground. For example, the sample depth designation will be "-0018" for the sample collected from an interval of 0 to 18 inches below ground – include as needed.
- **Sample Date**—Each sample will indicate the date on which it was collected, in YYMMDD format (e.g., "180301" for March 1, 2018).

Residential Soil Samples for XRF Analysis

- **Example**—A composite soil sample from the front yard of 1234 Main Street (MAIN1234) taken from the depth of 18 to 24 inches, collected March 1, 2018 would be identified as "MAIN1234-SO-F-1824-180301".

Exterior Air Samples from Residential Properties

- **Example**—An air sample collected at the entrance of the home at 1234 Main Street on March 1, 2018 would be identified as "MAIN1234-AR-E-180301".

Soil Stock Pile Waste Characterization Samples from Disposal Stock Pile Site

- **Example**—An air sample collected at the site of a Zone 2 disposal stock pile site on March 1, 2018 would be identified as "USS-SS-Z2P1-WC".

Air Samples from Disposal Stock Pile Site

- **Example**—An air sample collected at the site of a Zone 2 disposal stock pile site on USS-AA0508-042418-1. AA represents the sample matrix, 0508 represents month and date collected, 042418-1 is the ID assigned by the lab which represents the date the filter was prepared and the sequential order.

Interior Dust Samples

- **Example**—A dust sample collected from the living room of 1234 Main Street on March 1, 2018 would be identified as "USSL- MAIN1234-LR-180301". See Table 4 in Tetra Tech, Inc. *Final Sampling and Analysis Plan for Zone 2 and 3 Residential Inspection. USS Lead Site March 2017* which is provided in Appendix B of the *Interior Residential Dust Cleaning and Sampling Plan* for more examples.
- **Example**—An XRF sample for lead-based paint screening collected from the kitchen room wall of 1234 Main Street on March 1, 2018 would be identified as "USSL- MAIN1234-KIWL-180301". See Table 5 in Tetra Tech, Inc. *Final Sampling and Analysis Plan for Zone 2 and 3 Residential Inspection. USS Lead Site March 2017* provided in Appendix B of the *Interior Residential Dust Cleaning and Sampling Plan* for more examples.

26.4 Chain-of-Custody Procedures

Chains of custody will include, at a minimum, laboratory contact information, client contact information, sample information, and relinquished by/received by information as per the SOP. Sample information will include sample identification, date and time collected, number and type of containers, preservative information, analysis method, and comments. The chain of custody will also have the sampler's name and signature. The chain of custody will link location of the sample from the field logbook and sample processing log through sample disposal by the laboratory. The laboratory will use the sample information to populate the laboratory database for each sample.

Worksheet#28-1—Analytical Quality Control and Corrective Action

Note: Agronomic and Geotechnical laboratory analytical quality control and corrective action are not detailed below. Backfill and topsoil analytical quality control and corrective action are not detailed are not detailed below; refer to worksheet #23 for SOP references and Appendix A for SOPs.

Laboratory: ALS-Holland (Backfill and topsoil.)

Matrix	Soil, Interior Dust
Analytical Group	Metals
Analytical Method / SOP Reference	EPA 6020A HN-MET-008
Analytical Organization	ALS – Holland, MI

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equip blank	NA					
Matrix Spike/Duplicate MS/MSD	NA					
Sample Duplicate	One per matrix per analytical method for each batch of at most 20 samples per site.	Per Method and Lab SOP	Examine the project-specific DQOs. Notify lab QA Officer and Project Chemist of additional measures to be taken.	Analyst Project Chemist	Precision	Evaluate to determine if sample is homogenous

Matrix	Soil, Interior Dust
Analytical Group	Metals
Analytical Method / SOP Reference	EPA 6020A HN-MET-008
Analytical Organization	ALS – Holland, MI

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	Each group of 20 or less prior or analysis of samples.	Per Method and Lab SOP	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated batch for failed analytes in all samples in the associated batch, if sufficient material is available.	Analyst Project Chemist	Accuracy	QC acceptance criteria as specified by Lab SOP or QSM
Method Blank	Each group of 20 or less prior or analysis of samples.	No analytes detected ≥ LOQ as shown in Worksheet #15.	Correct problem, then re-prep and reanalyze the MB and all samples in the associated batch for failed analytes in all samples in the associated batch, if sufficient material is available.	Analyst Project Chemist	Sensitivity	No analytes detected ≥ LOQ as shown in Worksheet #15.

Matrix	Soil, TCLP
Analytical Group	Metals
Analytical Method / SOP Reference	EPA 6010C HN-MET-015
Analytical Organization	ALS – Holland, MI

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equip blank	NA					
Matrix Spike/Duplicate MS/MSD	NA					
Sample Duplicate	One per matrix per analytical method for each batch of at most 20 samples per site.	Per Method and Lab SOP	Examine the project-specific DQOs. Notify lab QA Officer and Project Chemist of additional measures to be taken.	Analyst Project Chemist	Precision	Evaluate to determine if sample is homogenous
LCS	Each group of 20 or less prior or analysis of samples.	Per Method and Lab SOP	Correct problem, then re-prep and reanalyze the LCS and all samples in the associated batch for failed analytes in all samples in the associated batch, if sufficient material is available.	Analyst Project Chemist	Accuracy	QC acceptance criteria as specified by Lab SOP or QSM

Matrix	Soil, TCLP
Analytical Group	Metals
Analytical Method / SOP Reference	EPA 6010C HN-MET-015
Analytical Organization	ALS – Holland, MI

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	Each group of 20 or less prior or analysis of samples.	No analytes detected ≥ LOQ as shown in Worksheet #15.	Correct problem, then re-prep and reanalyze the MB and all samples in the associated batch for failed analytes in all samples in the associated batch, if sufficient material is available.	Analyst Project Chemist	Sensitivity	No analytes detected ≥ LOQ as shown in Worksheet #15.

Matrix	Soil
Analytical Group	Percent Moisture
Analytical Method / SOP Reference	EPA 3550C HN-WC-018
Analytical Organization	ALS – Holland, MI

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Equip blank	NA					
Sample Duplicate	One per matrix per analytical method for each batch of at most 20 samples per site.	Per Method and Lab SOP	Examine the project-specific DQOs. Notify lab QA Officer and Project Chemist of additional measures to be taken.	Analyst Project Chemist	Precision	Evaluate to determine if sample is homogenous